WATER SPORT TOWING APPARATUS

Cross-Reference to Related Applications

[0001] This application is a continuation of and hereby incorporates by reference the disclosure of application Serial No. 10/095,387, filed March 12, 2002 which is a continuation of application Serial No. 09/624,166, filed July 24, 2000, which itself is a continuation of application Serial No. 09/399,683, filed September 21, 1999, now U.S. Patent No. 6,192,819, for "Water Sport Towing Apparatus," which itself is a continuation-in-part of application Serial No. 09/036,826, filed on March 9, 1998, now U.S. Patent No. 5,979,350 for "Water Sport Towing Apparatus And Method," which itself is a continuation-in-part of application Serial No. 29/078,494, filed on October 27, 1997, now U.S. Patent No. Des. 409,972 for "Boat Tower, all of which are commonly owned and assigned with the present invention.

Field of the Invention

[0002] The present invention generally relates to towing of a performer by a vessel, and more particularly to enhancing performance of the performer using a water sport implement while maintaining stability of the vessel.

Background of the Invention

[0003] Wakeboarding has become one of the fastest growing sports in the world. In the sport of wakeboarding, there is an ever increasing need for the tow boat to create a larger wake to ride. Unlike waterskiing, the performer on a wakeboard is looking for as large a wake as possible. Further, by anchoring the tow line at a high elevation above the boat deck, the greater the ability of the performer to lift higher into the air, whether with a ski or wakeboard.

[0004] Tow rope pylons are known in the art, such as those described in U.S. Patent No. 4,893,577 to Jennings and U.S. Patent No. 4,641,597 to Paxton. A typical skiing and wakeboarding pylon has a height of approximately three

feet to eight above the floor of the boat. Pylon heights have increased to accommodate the ever increasing height of jumps across the wake by wakeboarders. The extended pylons run a cable from the top of the pylon to the bow of the boat as a guy wire. This wire interferes with movement inside the boat. Further, these extended height pylons have not satisfied wakeboarders with their performance. They do give the performer the ability to get bigger air on the jumps, but the extended pylons flex too much when the performer cuts away or to the wake. During these cuts, the boat heels to a point of instability for the boat and a hazard for all concerned. The guy wire provides support when the skier is pulling straight back, but offers less support when the skier is pulling from the side.

[0005] The simplest way to increase the size of the wake is to increase the amount of weight inside a boat. Typically, this has been done by adding lots of people. Alternatively, the industry's response has been to include water bladders in the boat or other weighting materials such as buckets filled with concrete, rocks, or sand.

[0006] In one bladder system, a liner is placed inside of a canvas sack or bag. Filling the liner full of water by use of a bilge pump with hoses, wires and clips, can add weight to the back of a boat. However, this process is awkward and cumbersome. Another attempt at adding weight to the back of a boat is believed to include two gates on a transom of a boat. A cable is pulled to open the two gates and thereby flood two tanks located behind the transom of the boat. The tanks are drained by opening the gates. This system required a four foot high boat hull, where typical sports towing boats have a transom or hull height of only thirty inches from bottom to top of the gunwale.

[0007] As described, by way of example with reference to U.S. Patent No. 5,645,003 to Grinde, it is known to add water for ballasting, typically uniformly along the length of the boat or forward, as in U.S. Patent No. 4,528,927 to Lizuka et al. for enhancing the planing of the vessel. Typically ballast pumps are used to control the amount of water within the ballasting, as described, by way of example, with reference to U.S. Patent No. 5,215,025 to Talmor.

[0008] It is typically thought that by simply adding more weight to the boat, the wake will become bigger and better. However, the shape of the wake is as important as the size. The perfect slope, length and hardness of the lip of a wake are also important to enable the performer to release from the wake and achieve a desired launch into the air. Further, it is important that wake control be done in a relatively rapid and timely manner, not available with use of a typical ballast pump. During periods of non-performance by a performer, there is a need to improve travel between performance locations, whether over water or by trailer, without having to disassemble and then reassemble pylons and pylon rigging.

Summary of the Invention

[0009] In view of the foregoing background, it is therefore an object of the present invention to improve the aerial characteristics of a performance by a performer using a water sport implement, such as a wakeboard or ski, by way of example, and being towed by a vessel while maintaining the stability of the vessel.

[0010] This and other objects, features, and advantages of the invention, are provided by a method aspect of the invention comprising the steps of providing a vessel behind which the performer is to be towed, the vessel including a bow, a stern and an operator station between opposing sides, and fitting a first relatively rigid vertical support structure to a first one of the sides and fitting a second relatively rigid vertical support structure to a second one of the sides, and then extending a generally horizontal bridging portion between upper extremities of the first and second vertically extending support structures, at a height substantially above the level of the operator station. A tow rope is attached to the horizontally extending bridging portion, and the vessel is operated in a body of water while towing the performer from the horizontally extending bridging portion.

[0011] An apparatus of the present invention comprises a vessel behind which the performer is to be towed, the vessel including a bow, a stern and an

operator station between opposing sides, a first relatively rigid vertical support structure fitted to a first one of the sides of the vessel, a second relatively rigid vertical support fitted structure to a second one of the sides of the vessel, and a generally horizontal bridging portion extending between upper extremities of the first and second vertically extending support structures, at a height substantially above the level of the operator station. A tow rope is attached to the horizontally extending bridging portion for towing the performer from the horizontally extending bridging portion while operating the vessel in a body of water.

[0012] In an alternate embodiment, the apparatus further comprises pivotally attaching means for attaching the first and second generally vertically extending support structures to the respective sides of the vessel, so as to permit the first and second support structures to be rotated downwardly so that the vessel may pass underneath a bridge or into a boat house. Improvements to the rotatable feature of the present invention are provided by yet another preferred embodiment, wherein a towing apparatus comprises a vertical support rigidly dimensioned for rigidly attaching to a vessel at a location proximate an operator station of the vessel, a frame for extending upwardly from the vertical support to a height substantially above the level of the operator station, and attaching means for attaching the frame to the vertical support, the attaching means rigidly attaching the frame to the vertical support in an operating position for towing the performer, while permitting the frame to be rotated about the vertical support into a stored position on a deck of the vessel for reducing a height clearance of the vessel.

[0013] In one preferred embodiment, the coupling means comprise a ball and socket assembly carried by a first proximal end of the frame. The ball and socket assembly include a ball carried by the frame, a socket carried by the vertical support, and a shaft extending through the socket. The shaft has a distal end for engaging the ball and a proximal end for manipulating the shaft into and out of engagement with the ball for readily removable attachment of the ball with the socket and thus the frame with the vertical supports. A knob

is attached to the proximal end of the shaft, and a compression spring carried by the shaft and positioned between the knob and the socket for biasing the proximal end away from the socket. A pivotal linkage assembly operable between the frame and vertical support is positioned for rotating the frame about the vertical support when the shaft is disengaged from the ball.

Brief Description of the Drawings

[0014] A preferred embodiment of the invention as well as alternate embodiments are described by way of example with reference to the accompanying drawings in which:

[0015] FIG. 1 is a perspective view of a vessel and performer in accordance with the present invention;

[0016] FIG. 2 is an enlarged perspective view of the vessel of FIG. 1 with rear ballast tanks illustrated;

[0017] FIG. 3 is a partial perspective view of the ballast tanks carried within the vessel;

[0018] FIG. 4 is a perspective view of an alternate embodiment;

[0019] FIG. 5 is a partial side view of a towing element of the present invention;

[0020] FIG. 6 is a partial side view of the embodiment of FIG. 2 illustrating an operating erected position and a rotated storing position of a towing structure of the present invention;

[0021] FIG. 7 is a partial side view of an attachment portion of the towing structure of FIG. 6;

[0022] FIG. 8 is a partial front view of FIG. 7;

[0023] FIG. 9 is a partial side view of an alternate embodiment of FIG. 2;

[0024] FIG. 10 is a partial top plan view of the embodiment of FIG. 2;

[0025] FIG. 11 is a partial side view of an alternate embodiment of FIG. 2;

[0026] FIG. 12 is a partial top plan view of the embodiment of FIG. 11;

[0027] FIG. 13 is a partial side view of yet another embodiment of FIG. 2;

[0028] FIG. 14 is a perspective view of the vessel including an alternate preferred embodiment of a towing apparatus in keeping with the present invention;

[0029] FIG. 15 is a partial starboard side elevation view of the vessel and towing apparatus of FIG. 14 illustrating the towing apparatus in an operating position for towing a performer;

[0030] FIG. 16 is a view of the vessel and towing apparatus of FIG. 15 illustrating the towing apparatus in a stored position;

[0031] FIGS. 17 and 18 are partial side and front elevation views of a pivotal portion of the towing apparatus of FIG. 14;

[0032] FIGS. 19 and 20 are partial cross-section views of a coupling assembly of the towing apparatus of FIG. 14, illustrating an attached position and a detached position, respectively, between a frame and a support;

[0033] FIG. 21 is an exploded, partial cross section view of a ball and socket assembly of FIGS. 19 and 20; and

[0034] FIG. 22 is a schematic of a ballast tank control system of the present invention.

Detailed Description of the Preferred Embodiments

[0035] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited by the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

[0036] Referring now initially to FIGS. 1-3, a preferred embodiment of the present invention is herein described, by way of example, by a water sports system **10** for improving aerial characteristics of a performance by a performer **12** using a water sports implement such as a wakeboard **14**. The system **10** comprises a vessel **16** behind which the performer **12** is to be towed. The

vessel **16** includes a bow **18**, a stern **20**, and an operator station **22** between opposing starboard and port sides **24**, **26**. A towing structure referred herein as a vertical support unit **100** is fitted to the vessel **16**. The vertical support unit **100**, as will be further described later in this section, includes an upper portion **102** at a height above the level of the operator station **22** and is adapted for securing a tow rope **28** thereto. The tow rope **28** is attached to the upper portion **102** of the vertical support unit **100** for towing the performer **12**, as illustrated again with reference to FIG. 1. The system **10** further includes a ballast assembly **200** which includes starboard and port ballast tanks **202**, **204** fitted onboard and only aft, preferably within only the stern **20**, extending from the transom toward amidships of the vessel **16**, unlike typical ballast systems which fully extend bow to stern. Alternate embodiments include a single ballast tank. An extractor **206** is fitted to the hull of the vessel **16** and is in fluid communication with the body of water **30** within which the vessel operates for forcing water **208** into the ballast tanks **204**, **202** and weighting down the aft portion of the vessel **16**, thus lowering the vessel and controlling a wake **32** created by the vessel.

[0037] It is to be noted that various sized vessels will have varying length ballast tanks for extending the tank from the transom area to toward amidships to provide a desirable wake. Simply weighting down the vessel stern only proximate the transom leads to excess plowing of the vessel and an undesirable wake. Further, displacement boats having ballast from stern to bow, typically do not permit planing, desirable in a sports towing vessel. As a result, a certain amount of planing is to be maintained. By extending the ballast tank as herein described, an effective vessel performance and wake is achieved. Without deviating from the invention, alternate embodiments are now herein described.

[0038] With regard to the vertical support unit **100**, reference being made again to FIG. 2, the vertical support unit comprises a first relatively rigid vertical support structure **104** fitted to the starboard side **24** of the vessel **16**, a second relatively rigid vertical support structure **106** fitted to the port side **26,**

and a generally horizontal bridging portion **108** extending between upper extremities of the first and second vertically extending support structures at a desired height above the level of the operator station **22**. In a preferred embodiment, the vertical support unit **100** forms a skeletal frame, as illustrated again with reference to FIG. 2, which has a forward relatively rigid U-shaped support structure **110** and an aft relatively rigid U-shaped support structure **112**, both fitted across the beam of the vessel **16**. Longitudinally extending rigid bars **114** are attached between the forward and aft U-shaped structures. In a preferred embodiment, the bars are generally horizontal and parallel to the floor **34** of the vessel **16**, as illustrated with reference again to FIG. 2, by way of example. Such a frame transfers forces generated by towing the performer to the gunwales, by way of example, and provides a rigid anchoring of the tow rope to the vessel for improving over typical single tow bar devices referred to earlier in this specification. For convenience in shipping, the bridging portion **108** is separable from the vertical support structures **104**, **106** at connections **116**. In general, the preferred embodiment is made from generally rigid aluminum tubing with elements of the unit **100** welded to each other to form a generally rigid skeletal frame.

[0039] In yet another embodiment, and with reference to FIG. 4, the vertical support unit **100** comprises a pylon **118** extending from the floor **34** of the vessel **16** and having an upper portion adapted for securing the tow rope **28** thereto. As illustrated again with reference to FIG. 2, and illustrated further with reference to FIG. 5, a tow rope connecting element **120** is attached to the upper portion of the vertical support unit **100**, preferably to the horizontal bridging port **108** of the aft U-shaped support structure **112** for attaching the tow rope **28** thereto. The tow rope connecting element is mounted at a height **36** between 6' 3" and 7 feet above the floor **34** of the vessel **16**, but it is expected that other heights will be selected by those skilled in the water sports arts. At this height **36**, passengers on the vessel can comfortably walk under the U-shaped support structure **112** and the tow line **28** extending rearwardly from the boat for pulling the performer **12** while, at the same time, maintaining

stability for the vessel **16** as the performer maneuvers around the vessel during the performance.

[0040] The skeletal frame is an improvement over the pylon by providing a generally more rigid unit **100** secured to four mounting locations **122** at sides **24**, **26** of the vessel **16**. In a preferred embodiment of the invention, the vertical support unit **100**, as illustrated with reference again to FIG. 2, and to FIGS. 6-8, the system **10** further comprises attaching the vertical support unit **100** to vessel deck portions including starboard and port side gunwales **38**, **39**, so as to permit the unit to be rotated when the vessel needs to pass underneath a bridge or into a boat house, by way of example. In a preferred embodiment, anchoring plates **124** are located about the operator station **22**. The anchoring plates **124** each include a shaft **126** which terminates in a free end **128** having a through hole for receipt of a pivot pin or bolt **130**. Removably and rotatably mounted on the anchoring shafts **126** are lower extremities **132** of the skeletal frame, as illustrated with reference again to FIGS. 7 and 8. As illustrated with reference to FIG. 11, an alternate arrangement includes mounting the plates **124** to the floor **34** of the vessel **16**.

[0041] Towing a trailer carrying the vessel is made more convenient with this rotating feature. In the event the overall height of the unit **100** needs to be reduced during hauling of the vessel on a trailer, by way of example, the unit **100** is rotatable to a position **134** shown in dotted lines in FIG. 6 or is removable entirely from the vessel **16**. As illustrated again with reference to FIGS. 7 and 8, the pin or bolt **130** is removed from the appropriate anchoring plates **124** for rotating the unit **100** onto the forward deck of the vessel or aft at the convenience of the operator.

[0042] Improvements to a preferred embodiment of the present invention are made to enhance the portability and storing of the vertical support unit **100**, earlier described, and hereon initially illustrated with reference to FIGS. 14-16, wherein one preferred embodiment of a towing apparatus **300** comprises starboard and port elongate vertical supports **302**, **304** rigidly attached to the starboard side and port side gunwales **38**, **39**, respectively, of the vessel **16** at

a location generally outboard the operator station **22**. Each of the vertical supports includes an upwardly extending forward portion **306** having a proximal end **308** rigidly mounted via a mounting plate **310** to the gunwale **38**, **39**, an upwardly extending aft portion **312** having a proximal end **314** rigidly mounted to the gunwale **38**, **39** via a mounting plate **316**, and a middle portion **318** extending between distal ends **320**, **322** of the forward and aft portions. As further illustrated with reference again to FIGS. 15 and 16, the distal end **322** of the aft portion **312** extends to a higher elevation above the surface of the gunwale **38**, **39** than does the distal end **320** of the forward portion **306**. This permits an aft portion **423** of a frame **326** to be shorter in length than a forward portion **328** of the frame, allowing for a lower elevation of the frame when in a stored position **328**, as illustrated with reference to the elevation line **329** of FIG. 16.

[0043] In an operating position **330**, the frame **326** extends upwardly from and between the starboard and port elongate vertical supports **302**, **304** to the height **36** substantially above the level of the operator station **22**, as earlier described with reference to FIG. 2. An aft proximal end **332**, **333** of the frame **326** is readily removable attached to each of the elongate vertical supports **302**, **304**, and a forward proximal end **334**, **335** of the frame is pivotally attached thereto for rigidly securing the frame in the operating position **330**, see FIG. 15, when the aft proximal end is attached, while permitting the frame to be rotated about the forward proximal end to the stored position **328**, see FIG. 16, on the deck **336** of the vessel **16** when the aft proximal end of the frame is detached and rotated.

[0044] As illustrated with reference again to FIGS. 15 and 16, by way of example, a tow rope connecting element **338** is attached to a distal end **340** of the frame **326** for attaching the tow rope **28** thereto used in towing a performer from the frame while operating the vessel in a body of water. The distal end **340** is upwardly angled, allowing the distal end to lie generally flat onto the deck **36**, with the toe rope connecting element **338** conveniently received within the open styled deck for the vessel herein described, by way of

example. As earlier described, and as illustrated in the operating position **330** of FIG. 15, by way of example, with forward and aft U-shaped supports **342**, **344**, rearwardly angled and vertically extended, the aft support **344** is shorter in length than the forward support **342**, allowing for the reduced elevation line **329** earlier described with reference again to FIG. 16.

[0045] By way of further detail, and as illustrated with reference to FIGS. 17-18, the forward U-shaped support **342** is pivotally attached at each of its ends to the starboard and port vertical supports **302**, **304**, at the forward distal ends of the upwardly extending forward portions **306**. A pivotal linkage assembly **346** includes a pivot pin **347** operable with a mating fork assembly **348**. As illustrated with reference t o FIGS. 19-21, the aft U-shaped support **344** is readily removably attached to the distal ends **322** of the upwardly extending aft portion **312** of the vertical supports **302**, **304**. The forward U-shaped support **342** is rigidly attached to the aft U-shaped support **344** at multiple weld points **350** and with the use of attaching arms **352**.

[0046] In a preferred embodiment, herein described by way of example, a coupling assembly **354** is operable between the frame **326** and the vertical supports **302**, **304**, and is described in detail with reference to FIGS. 19-21. The coupling assembly **354** comprises a ball element **356** attached to the proximal ends of the aft U-shaped support **344** and a socket element **358** carried by the distal ends of the upward extending aft portions **312** of the starboard and port vertical supports **302**, **304**. A shaft **360** extends through the socket element **358** and has a threaded distal end **362** for engaging a threaded bore **364** within the ball element **356**. A knob **366** is attached to the proximal end **368** of the shaft **360** for manipulating the shaft into and out of engagement with the ball element **356** and for readily removing the ball element from engagement with the socket element **358**, and thus the frame **326** from the aft portion of the vertical supports **302**, **304**. A compression spring **370** is carried by the shaft **360** and is positioned between the knob **366** and the socket element **358** for biasing the knob away from the socket element and thus avoid excessive movement of the shaft and knob when in a

disengaged position **372**, as illustrated again with reference to FIG. 20, illustrating the compression spring in an extended position. To rigidly secure the aft portion of the frame **326** to the aft portions of the supports **302**, **304**, the ball element **356** is guided into the socket element **358** in an indexing manner, and the threaded end **362** of the shaft **360** is manually engaged by pushing and turning the knob **366** to place the coupling assembly **354** into a secured position **374**, as illustrated with reference again to FIG. 19, illustrating the compression spring in a compressed position. The pivotal linkage assembly **346** pivotally connecting the forward portion of the frame **326** to the forward portion of the vertical supports **302**, **304** is positioned for rotating the frame about the vertical supports when the shaft **360** is disengaged from the ball element **357**. A washer **374** is inserted between the socket element **358** and the compression spring **370**. A snap ring **376** secures the shaft **360** within the socket element **358** and limits axial movement as further illustrated with reference to FIG. 20.

[0047] With such structures as herein described, it is convenient to use portions of the unit **100** to stow (i.e., store or attach) various pieces of ancillary equipment such as a life vest **40** or wakeboard **42** and other equipment, as illustrated by way of example, with reference again to FIG. 6 and FIG. 9. Further, the convenient mounting of stereo speakers is also accomplished. Such equipment is also conveniently stowed out of the way when unit **100** is in the erect position **136** as earlier described with reference to FIGS. 1 and 2.

[0048] As illustrated with reference to FIG. 10, a clear line of sight is provided for individuals sitting in the seats **44** so as not to interfere with the steering of the vessel **16** or the maneuvering of passengers onboard. As illustrated, by way of example with reference to FIGS. 2, and 9-14, various embodiments of the present invention are possible without deviating from the intent and value thereof.

[0049] As illustrated with reference again to FIGS. 2-3, and to FIG. 22, a preferred embodiment of the system **10** and the ballast assembly **200**, a lower most portion **210** of each of the ballast tanks **202**, **204** is preferably fitted at the

waterline **212** of the vessel **16** when the tanks are empty, typically the floor **34** for towing vessels as herein described.

[0050] In preferred embodiments of the ballast tanks **202**, **204** and with reference again to FIGS. 3 and 22, the ballast tanks are enclosed and each have an opening arranged through vent lines **214**, **216** for venting air into and out of each of the enclosed tanks **202**, **204** respectively. Further, an air control valve **218** is within easy reach by the vessel operator for manually controlling air venting to each of the ballast tanks. It is anticipated that electrically, pneumatically or hydraulically operated control valves may be appropriate. The extractor **206**, earlier described, includes a water scoop **220** positioned below the water line **212** and on the hull **46** of the vessel **16** for extracting the ballast water **208** from the body of water **30** as the vessel **16** moves through the body of water and delivering the ballast water **208** through a water intake line **221** connected between the scoop **220** and ballast tanks **202**, **204**. In an alternate embodiment, a two way pump **222** is placed within the line **221** and used for enhancing the extracting and dumping of the ballast water **208**.

[0051] Further, a shut off valve **223** is fitted within the line **221**. As illustrated again with reference to FIGS. 2 and 3, the ballast tanks **202**, **204** comprise starboard and port enclosed ballast tanks wherein each of the starboard and port enclosed ballast tanks comprises a generally L-shaped tank having a first elongated leg **224** fitted beneath quarter gunwales **26** of the vessel **16** and a second leg **228** fitted along an inboard side of the transom **230**.

[0052] As illustrated with reference again to FIG. 3, intermediate of the stern **20** and bow **18** is the operator's seat **45** within which the operator sits to control steering while viewing instruments. The air control valve **218** is within easy reach of the operator.

[0053] As illustrated again with reference to FIG. 22, the inlet line **221** leads to a water scoop **220** which collects the ballast water **208** as the vessel **16** is moved forward through the body of water **30**. The water **208** collected in the scoop **220** is fed through the intake line **221** upon proper positioning of the valves **218**, **223**. If the shut off valve **223** is closed, no water **208** will be

allowed to be fed into ballast tanks **202**, **204**. In addition, water **208**, if already in ballast tanks **202**, **204** will not be allowed to leave the tanks. However, if the water **208** is to be introduced into ballast tanks **202**, **204**, the shut off valve **223** must be opened and in addition, the respective air line control valve **218**, independently controlling each of the air lines **214**, **216** must be opened to allow air to escape from the ballast tanks as the water is being scooped up and fed into the tanks. Thus, if the air line control valve **218** is open, water **208** will be forced into ballast tanks **202**, **204** as the boat is moving forward until the ballast tanks are full or the valves are closed. Excess water is forced through the air lines **214**, **216** past the air line control valve **218** as one indication that the tanks are full. Alternatively, water level indicators **232** are used. Additionally, tank overflow tubes **234** fitted with one way check valves **236** deliver excess water overboard, as illustrated again with reference to FIG. 22. The overflow tubes **234** limit the maximum pressure in the tanks to a maximum static head. The check valves **236** stop air from flowing back in the tanks when the air control valve **218** is closed.

[0054] To remove the water **208** from the tanks **202**, **204**, the vessel comes to a stand still in a preferred method of dumping the ballast water. The shutoff valve **223** is then opened, with the opening of the air control valve **218** for allowing air into the air lines **214**, **216**. Through the forces of gravity, the water **208** flows out of the tanks **202**, **204** through the intake line **221** and out through the opened shutoff valve **223** to the surrounding body of water **30**.

[0055] Since the operator sitting in seat **45** has easy access to both valves **218**, **223**, the amount and shape of the wake **32**, illustrated with reference again to FIG. 1, produced by the vessel **16** can be precisely controlled by the operator. By selectively shifting the ballast water **208** into and out of the tanks **202**, **204**, the wake **32** is produced to a controlled degree for optimum and desirable wakeboarding.

[0056] Accordingly, many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated

drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims.